

Contactless electronic communication device with
optional auxiliary power source

The invention relates to contactless electronic communication systems in which at least one electronic communication device without an internal electric power source carried by a user communicates, by means of electromagnetic signals, with an electronic interrogation/reading/writing device.

Such contactless electronic communication systems are used, for example, for controlling access to ski runs, premises, garages, public transportation, etc, since the absence of any contact increases the speed of passage of the users whilst allowing exchange of information between the electronic device carried and the interrogation/reading/writing device so as to manage access according to certain criteria.

The electronic interrogation/reading/writing device emits electromagnetic signals, for example at radio frequency, which are detected by the electronic

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communication device carried by the user and serve on the one hand as a transmission medium for the information to be exchanged and on the other hand as an energy source for the electrical power supply to the electronic communication device. To this end, the latter comprises, for example, as shown in the simplified diagram in Figure 1, an antenna 10 consisting of a resonant circuit 12 comprising a coil 14 and a capacitor 16. The radio frequency signals received by the antenna 10 coming from the interrogation/reading/writing device are applied to a demodulator 18 which detects the low-frequency modulation signals containing the binary information transmitted by the interrogation/reading/writing device.

These binary information signals are processed by a digital processing circuit 20 in order to interpret them and if necessary produce a response in the form of binary signals which are transmitted to the interrogation/reading/writing device via a modulator 24 represented by a switch 22 and a load impedance (30) connected to the terminals of the resonant circuit 12.

The radio frequency signals detected by the antenna 10 are also applied to a rectifying and filtering circuit 26 which supplies, at the terminals A and B, a supply voltage V_{CC} to the circuits 18, 20 and 24.

The contactless electronic communication device according to the diagram in Figure 1 is produced in the form of a microcircuit 28 disposed in a plastic card,

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of the bank card type, the coil 14 of the antenna being disposed along the periphery of the card, the whole constituting a communication module MC.

It should be noted that the capacitor 16 is produced partly in the microcircuit 28 and partly outside it with a view to the tuning adjustment of the resonant circuit 12.

Such a microcircuit can also be disposed in the case of a watch, the material of the case being designed to allow passage of the electromagnetic signals to the antenna inside the case.

Such contactless electronic communication systems have the major drawback that their operating distance is limited, for example a few tens of centimetres at the frequency of 13.56 MHz in read/write mode, because of the inadequacy of the electrical supply power which is actually available for the microcircuit, beyond a certain distance between the interrogation/reading/writing device and the antenna.

In addition, this inadequacy of the electrical supply power limits the speed and therefore the calculation power of the microcircuit, which does not make it possible to implement complex transactions requiring major data processing and/or cryptographic calculations for the purpose of security in a short interval of time.

Moreover, it is not possible to increase the radiation energy of the interrogation/reading/writing devices since their power is limited so as not to interfere with adjacent installations and the

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The purpose of the invention is therefore to produce a contactless electronic communication device which has a maximum operating distance and a calculation power which are greater than those of the devices of the prior art.

The invention therefore relates to a contactless
electronic electromagnetic communication device of the
15 type comprising in a module:

- The connection means also comprise a switch for
30 establishing or cutting off the connection between the

power source and the terminals of the rectifying and filtering circuit.

The connection means comprise:

5 - in the module, conductors for connecting the output terminals of the rectifying and filtering circuit to first contact terminals,

 - in the support means, conductors for connecting the electrical power source to second contact terminals, and

10 - means for connecting together the said first and second contact terminals.

When the module is carried by a card of the bank type

15 - the means of supporting the electrical power source comprise a card holder, and

 - the means of connecting the said first and second contact terminals comprise means of guiding and holding the card in the card holder so as to make the said first and second contact terminals coincide.

20 When the module is disposed in a case

 - the means of supporting the electrical power source comprise an object such as a watch with an electric battery,

25 - the first contact terminals comprise a connector disposed on the case of the module,

 - the second contact terminals comprise a connector disposed on the watch case, and

30 - the said connectors cooperate with each other in order to establish electrical connections and being held in this position by holding means carried by the

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- Figure 7 is a perspective view of a case containing a contactless communication module and

designed to adapt to a watch containing an electric battery,

- Figure 8 is a view in section of the case of Figure 7,

5 - Figure 9 is a view in exploded perspective of the case of Figure 7 and of the case of the watch containing the electric battery,

10 - Figure 10 is a view in exploded perspective of a variant combination between a case containing a communication module and a watch containing an electric battery,

- Figure 11 is a view in perspective from below of the case of Figure 10,

15 - Figure 12 is a view in perspective of a case containing a contactless communication module associated with a mobile telephone handset according to the invention, and

20 - Figure 13 is a view in perspective of a portable mobile telephone handset associated with a microcircuit card according to Figure 2A.

The diagram in Figure 1 of a contactless electronic device will not be described again for the elements known from the prior art.

25 To implement the invention, it must be modified in order to connect, via conductors 32, 34, the output terminals A and B of the rectifying and filtering
 ? circuit 26 with two contact terminals 36 and 38 disposed outside the module MC containing the microcircuit 28 and the resonant circuit antenna 10.

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The so-called contactless communication module MC is normally housed in the thickness of a plastic card 40, the coil 14 of the antenna 10 being housed at the periphery of the card in one or more turns. According to the invention, the contact terminals 36 and 38 are disposed on the surface of the card 40.

The card 40 cooperates with a card holder PC so as to be inserted, by sliding for example, in raised grooves 42 and 44 with a stop 46. The card holder serves as a support for an electric battery 48 housed in the thickness of the card holder. The electrical terminals of the battery 48 are connected by conductors 50 and 52 housed in the thickness of the card holder, to contact terminals 56 and 58 disposed at the surface of the card holder so as to cooperate respectively with the contact terminals 36 and 38 of the card 40, it being understood that the card 40 in Figure 2A must be turned over in order to be inserted in the grooves 42 and 44.

The electrical connection between the electric battery 48 and the contact terminals 56 and 58 may be permanent or intermittent as required by the user provided that a switch 60 is connected in series, on the conductor 50 for example, which is handled by the user.

By means of this combination of the card 40 with the card holder PC, the microcircuit 28 is supplied with the voltage of the electrical battery 48, which can replace or possibly be added to the voltage supplied by the rectifying and filtering circuit 26.

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The switch 60 can be of the push button microswitch type housed in the thickness of the card holder, the push button being for example disposed on the face of the card holder opposite to the one receiving the card 40.

Naturally, the microswitch and its push button can
5 be housed in the cavity of the extra-flat battery.

The invention also applies to any contactless electronic module as modified in order to have contact terminals 36 and 38 so as to be connected to contact terminals of a battery carried by an object such as an electronic watch or a mobile telephone handset.

A watch MO (Figures 3 to 11) of the electronic
30 type comprises an electronic circuit (not shown), a

display device (62) with one or more dials 64, 66, 68 and an electrical supply battery 70, these three components being disposed in a case 72 provided on its periphery with various control buttons 74. The case 72 is held on the wrist by a bracelet 76 via connection articulations 78.

According to the invention, the electrical battery 70 is connected not only to the electronic circuit and to the dials but also to a connector 80 (Figures 3 to 9), of the female type for example, which is carried by the lateral part of the watch case 72. This connector 80 cooperates with a male connector 82 carried by a case 84 containing the microcircuit 28, the antenna coil 14 and the electrical conductors 32 and 34. A microswitch 86 is connected in series to the conductor 32 so as to supply or not the microcircuit 28 at the request of the user.

The case 84 is fixed to the back of the watch by snapping on the male 82 and female 80 connectors and by means of a lug 88 under which a thinned part 90 of the case 84 fits.

Instead of being disposed on the lateral face of the watch, the output connector of the electrical battery 70 can be disposed on the back of the watch case in the form of two contacts 100 and 102 (Figures 10 and 11) which cooperate respectively with two studs 104 and 106 on a case 108 containing the electronic microcircuit 28, the antenna coil 14 and the electrical conductors 32 and 34.

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5 The case 108 is fixed to the back of the watch by
two brackets 112, 114 which cooperate respectively with
two housings 116 and 118 disposed in the back of the
watch. The case 108 has a thinned peripheral part 120
for release.

20 Some mobile telephones 138 (Figure 13) are
equipped with a connector 140 (Figure 13) in which a
card of the bank type can be inserted with a view to
adding additional functions to the mobile telephone.
In this case, the contactless card 40 of Figure 2A can
25 be inserted in the connector 140 so as to connect its
contacts 36 and 38 to the electrical supply contacts of
the connector 140. The switch 142 is disposed on the
mobile telephone 138.

It should be noted that the switch 60 or 142 is
30 carried by the card holder PC or the mobile telephone

138, which contains the electrical power source, whilst the switch 86 or 134 is carried by the case 84 or 130, which contains the microcircuit 28.

5 It should be noted that the electrical power source can be a rechargeable battery, an electrical battery, removable or not, or so-called solar cells, for example of the photovoltaic type.

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